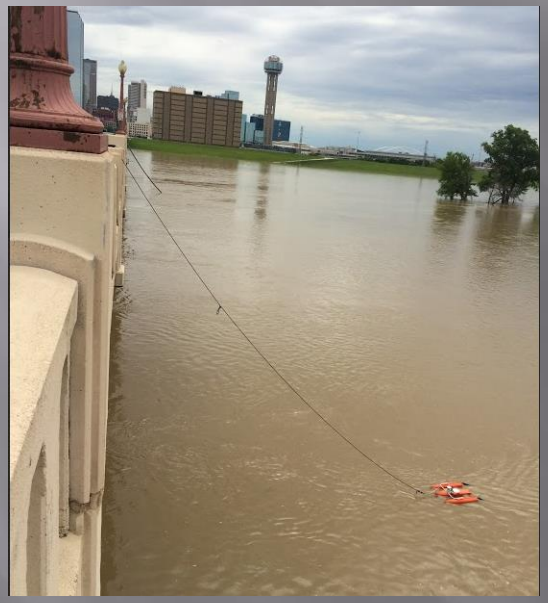
# Flooding in Texas, May 2015



# Flooding in May 2015

- Who is USGS and why are we involved?
- What do we do during floods?
- Information about May 2015 Flood

# U.S. Geological Survey

- Nation's premiere earth and biological science agency.
- Our job is to collect data and provide information to better understand the environment, and how humans interact with the environment.


# U.S. Geological Survey Mission Areas

- Ecosystems
- Climate and Land-Use Change
- Natural Hazards
- Water
- Energy and Minerals
- Environmental Health
- Core Science Systems

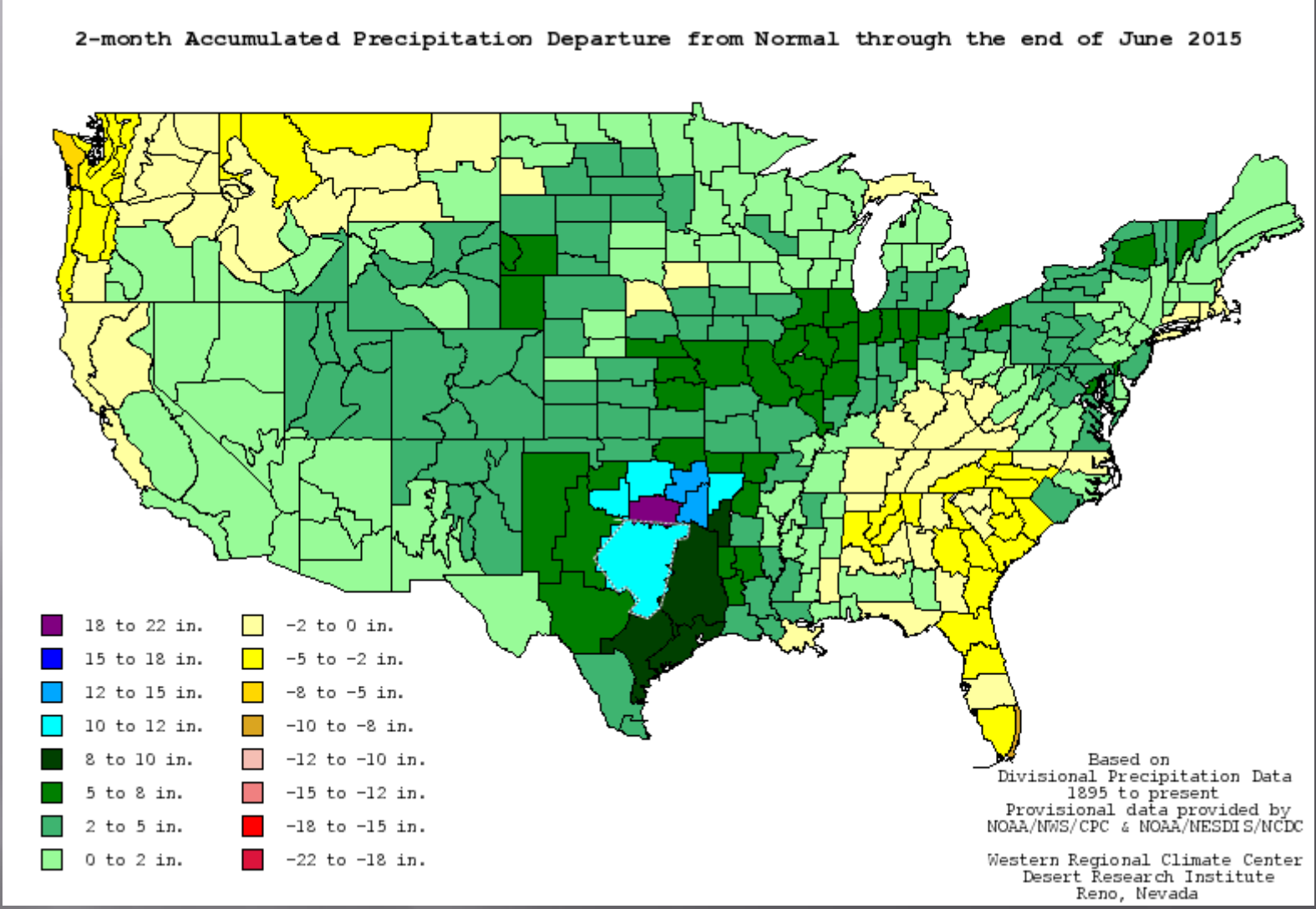
# Water Resources Mission

To provide reliable, impartial, timely information that is needed to understand the Nation's water resources

- Minimize loss of life and property from water-related hazards, such as floods, droughts, and land movement

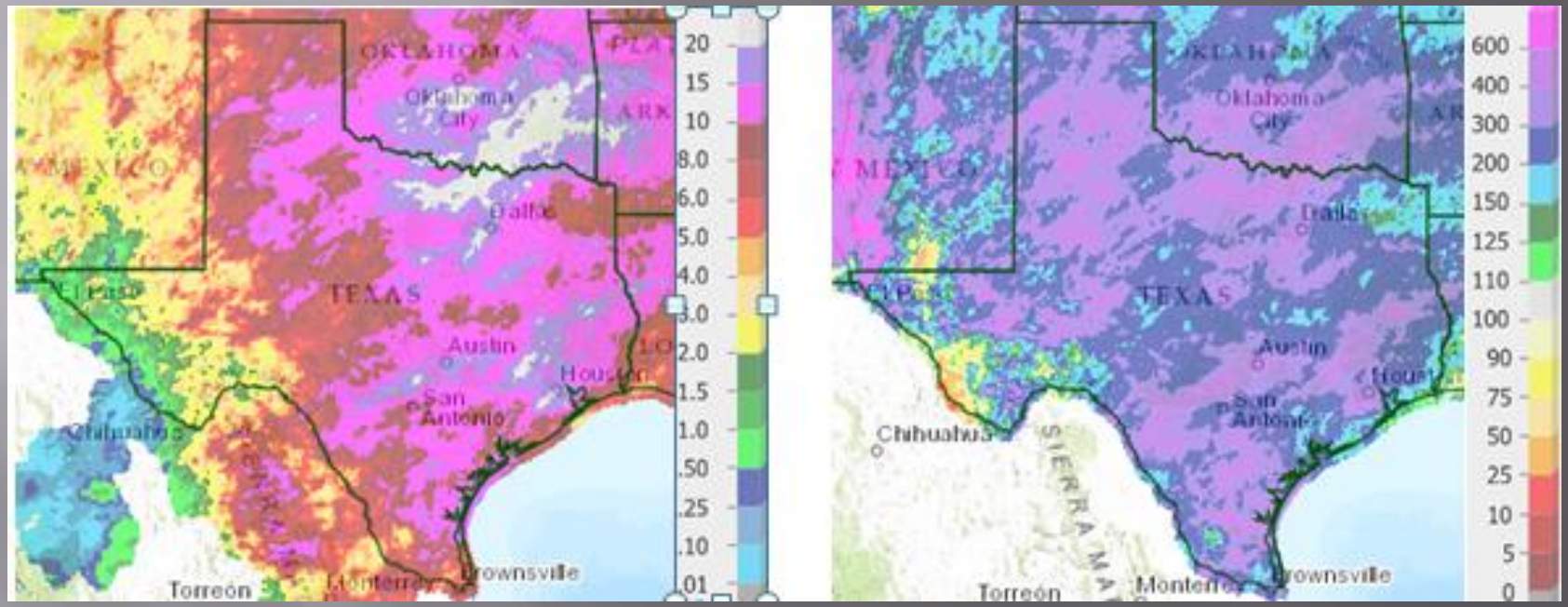
# Flooding in Texas, May 2015

- Flooding was a result of extended rainfall across the entire State of Texas due to persistent upper-level low in northern polar jet stream
- According to NWS, May 2015 was "**wettest month on record**, with statewide average precipitation of 9.06 inches"
- USGS response to flooding began in Lubbock in early May and spread to all other offices (Austin, Houston, Fort Worth, San Angelo, San Antonio, and Wichita Falls) by the middle of the month. USGS response continued into June 2015.
- During the month, **all major rivers (except the Rio Grande**) experienced flooding
- Damages in Houston area estimated to be $45 million according to Harris County Office of Homeland Security and Emergency Management. Hays county estimated $32.7 million in damage due to Blanco River flooding. Texas Department of Transportation estimated damages to their infrastructure at $27 million. (Source: http://www.theguardian.com)




From Western Regional Climate Center, Desert Research Institute, http://www.wrcc.dri.edu/

# Precipitation in May 2015




Precipitation in Inches

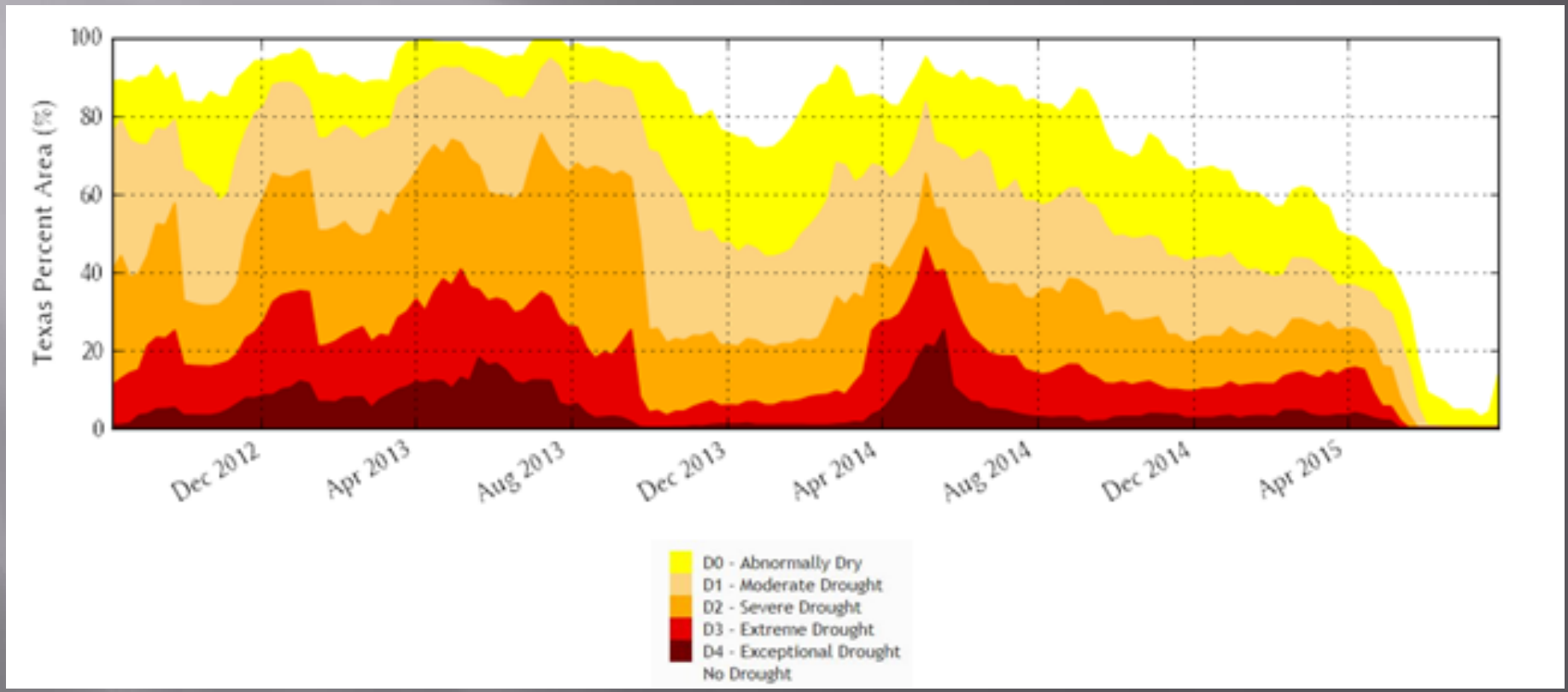
Precipitation in Percent of Normal

From National Weather Service
http://water.weather.gov/precip/

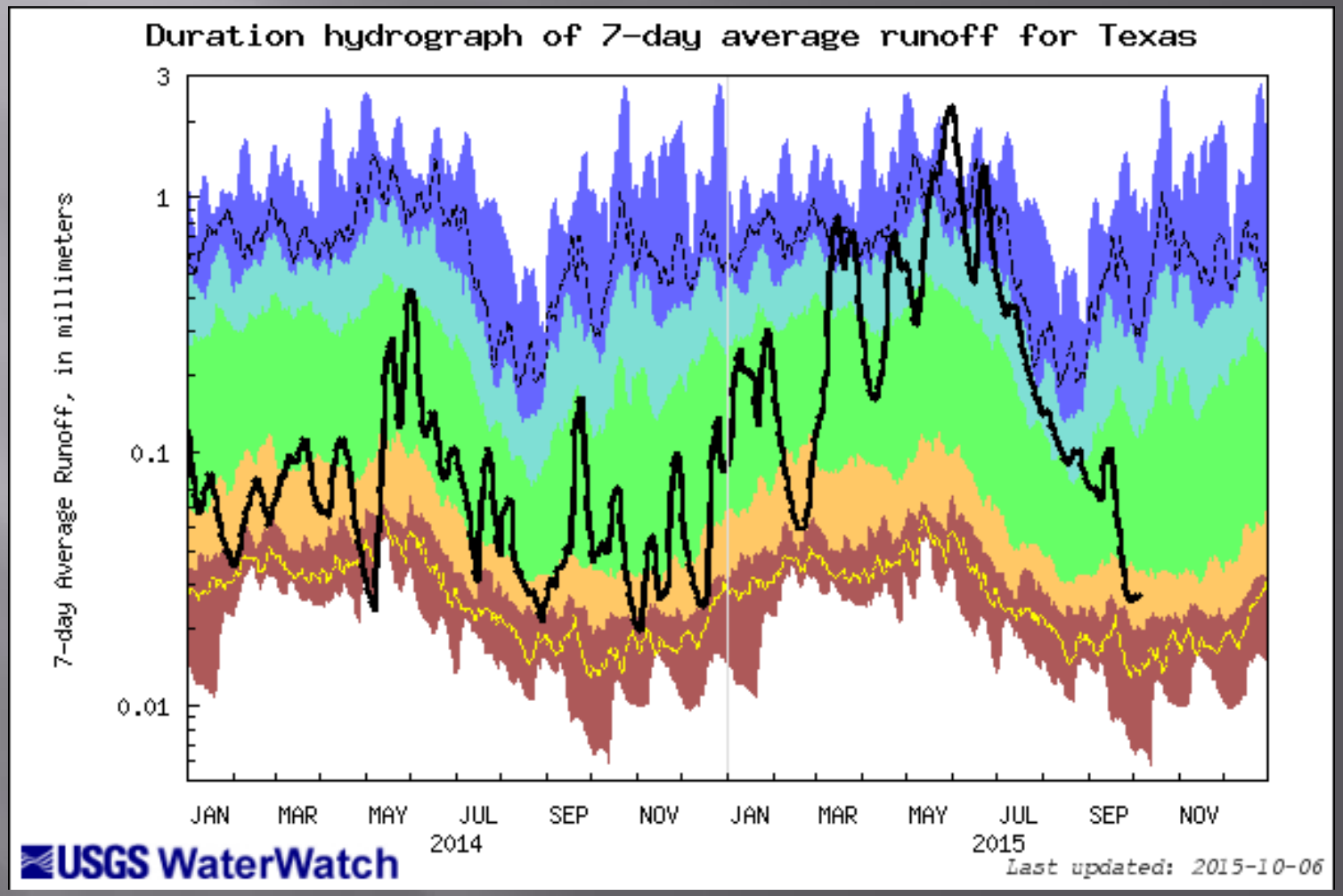
# Flow Conditions at USGS Stations May 2015

Flow Conditions in May

# Palmer Drought Index
# April 2012 – July 2015

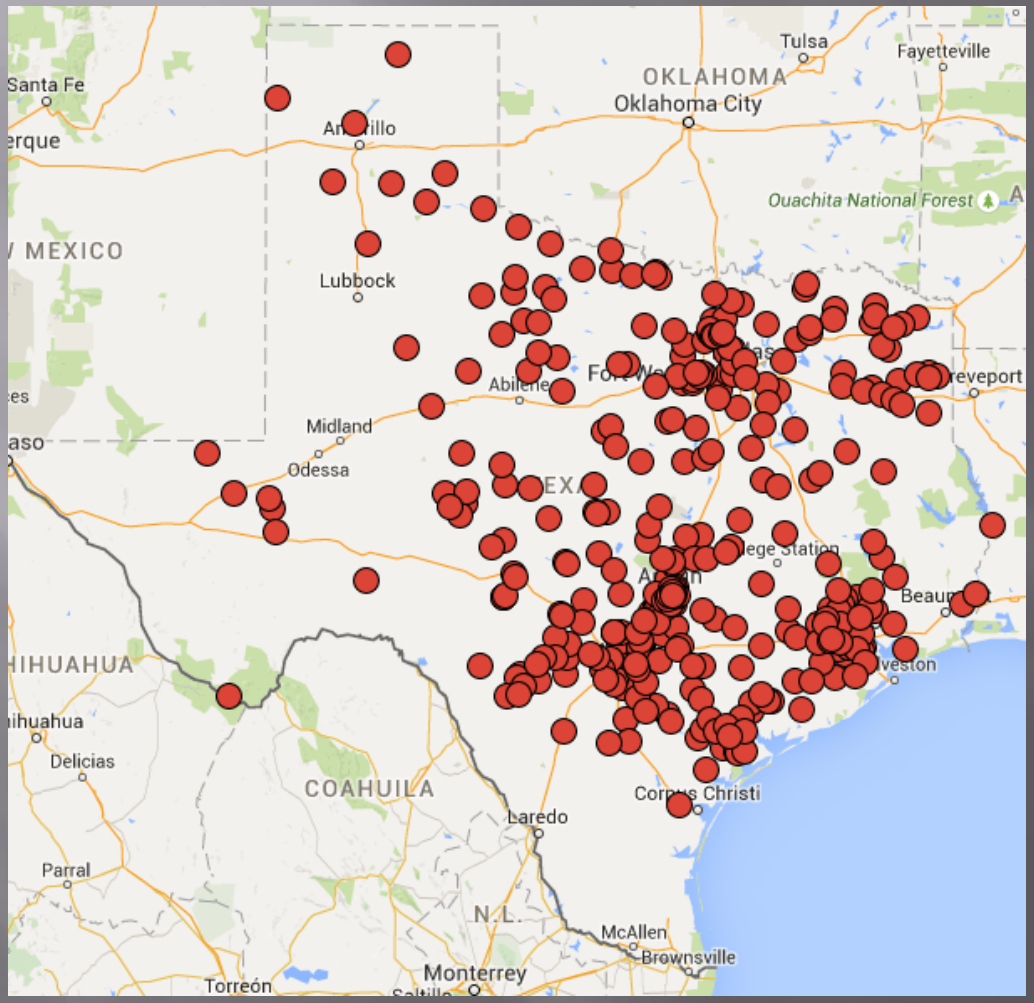



Data from U.S. Drought Monitor,
http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?TX/



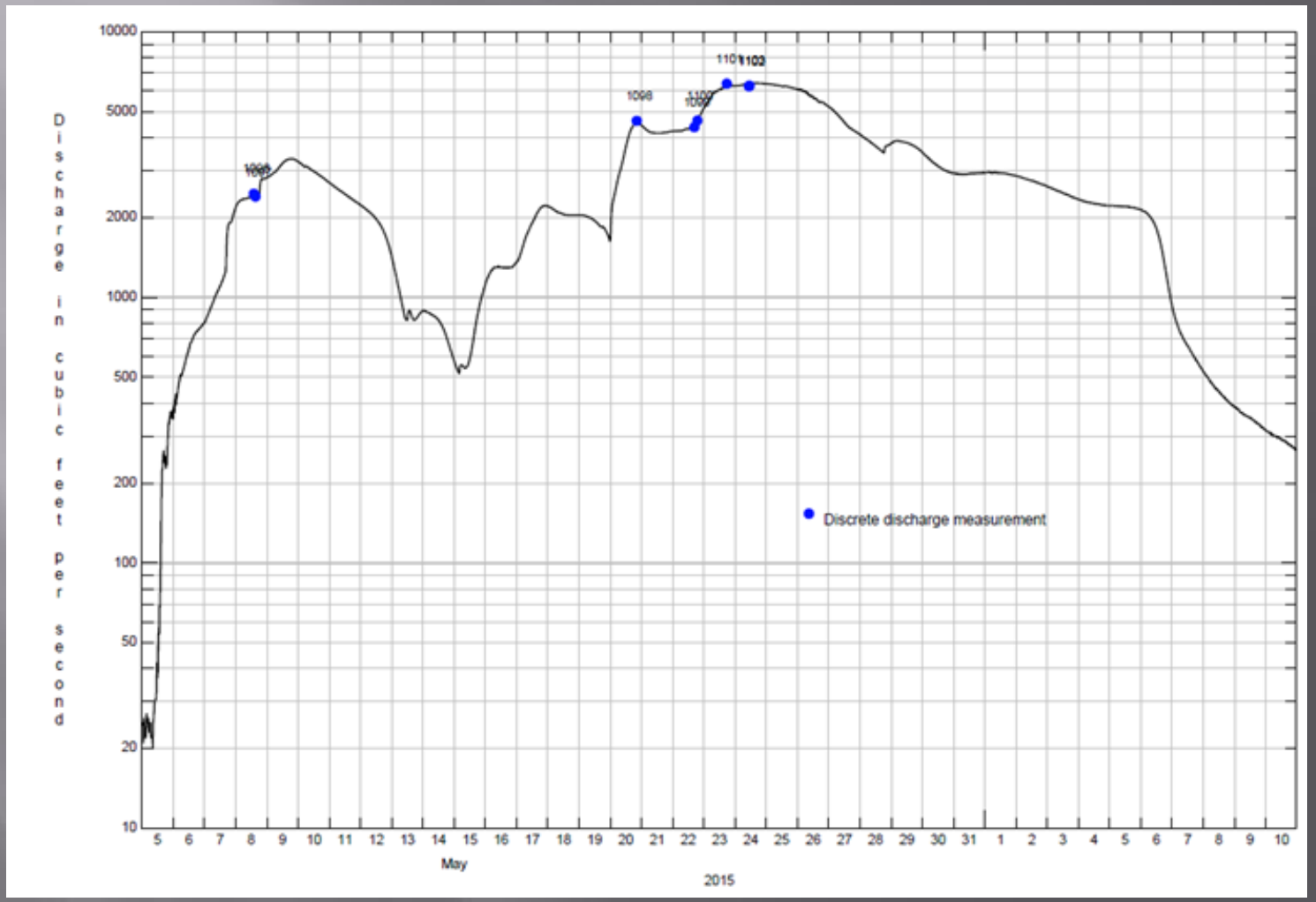

USGS Water Watch http://waterwatch.usgs.gov/index.php?id=hucdur

# Sites with Direct Discharge Measurements in May 2015 (539 Msmts at 356 Stations)




Approximately 200 measurements in a typical month

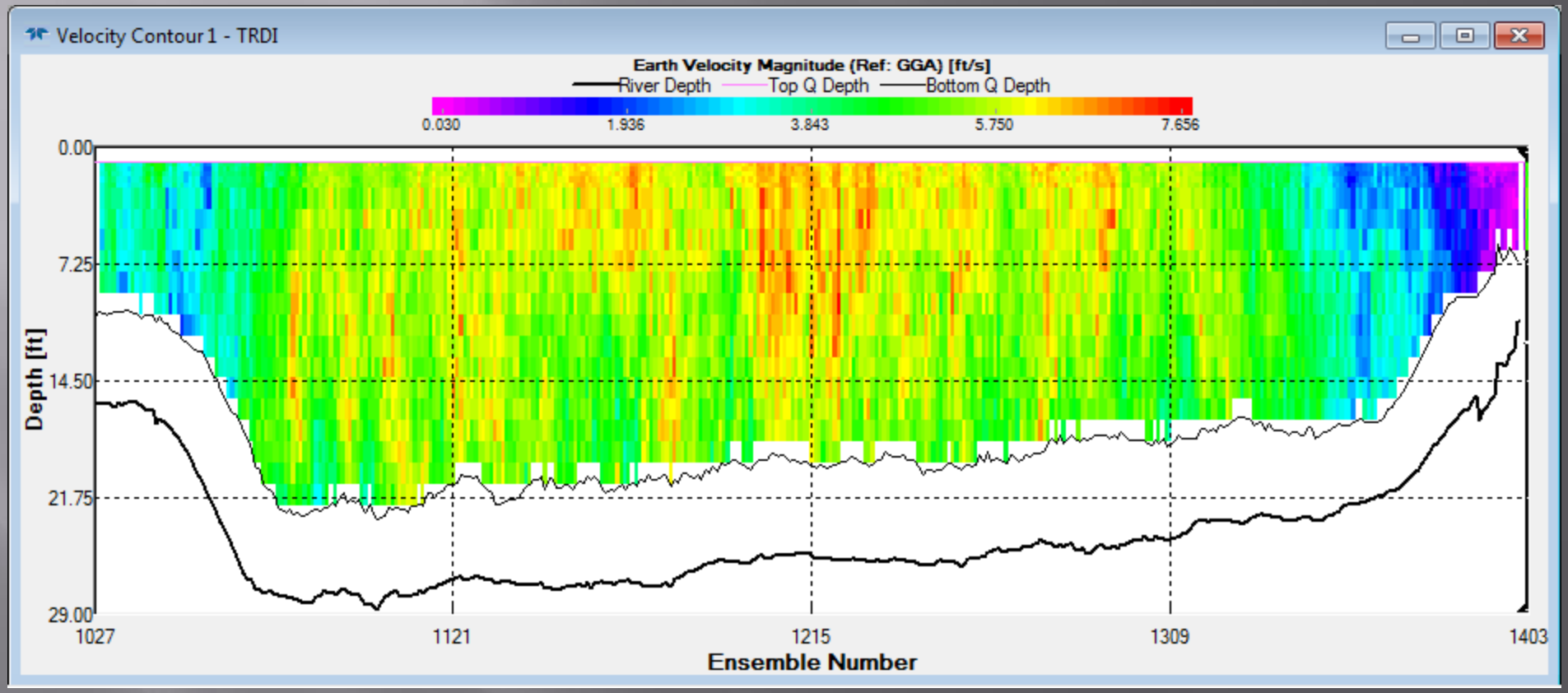
# Wichita Rv at Wichita Falls, TX



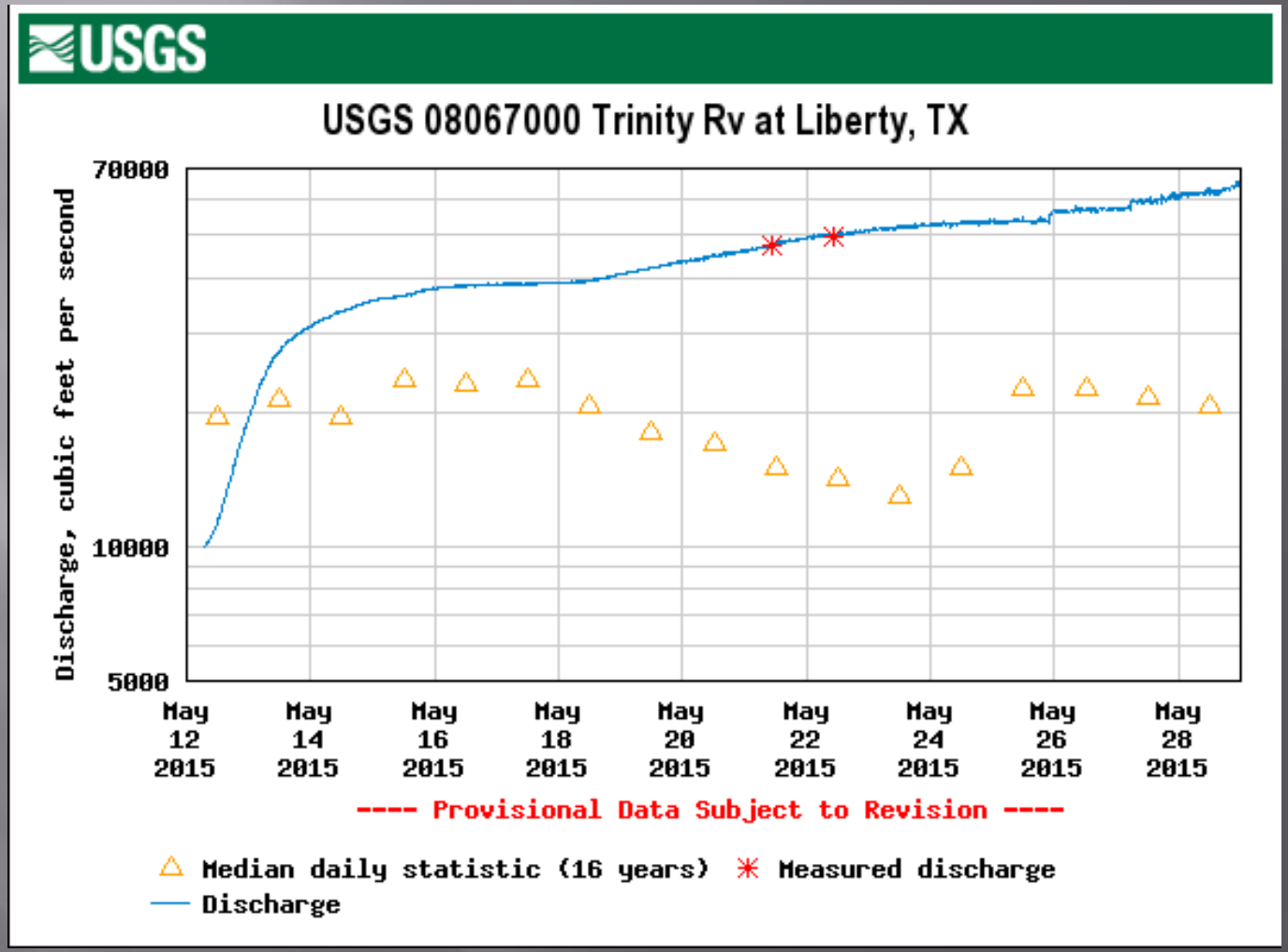
# Traditional Discharge Measurement at 08079600 – DMF Brazos Rv at Justiceburg (9,700 cfs)

# Discharge measurement at 08067000 – Trinity Rv at Liberty (47,000 cfs)

# Discharge Measurement using ADCP



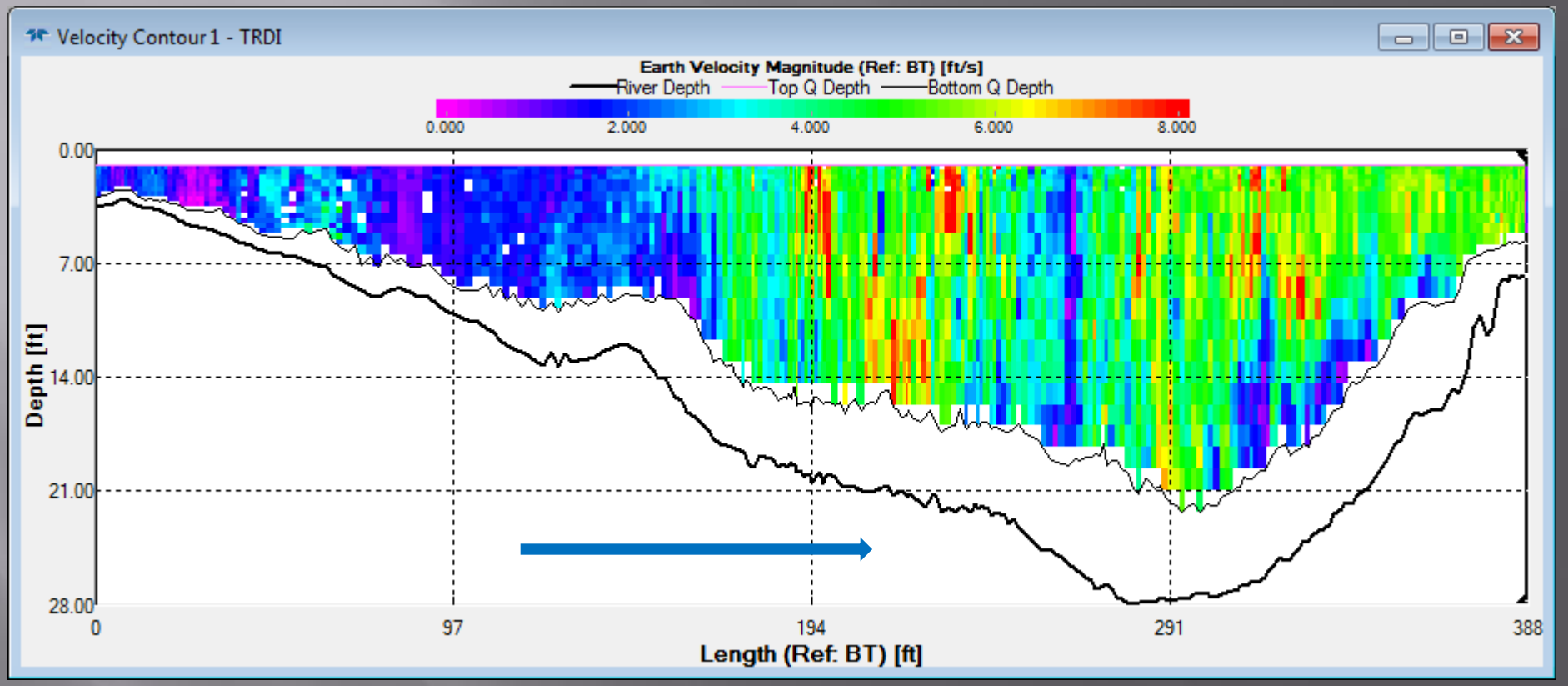
# Discharge Measurement



# Making a Measurement

ADCP Discharge Measurement

# Making a Measurement

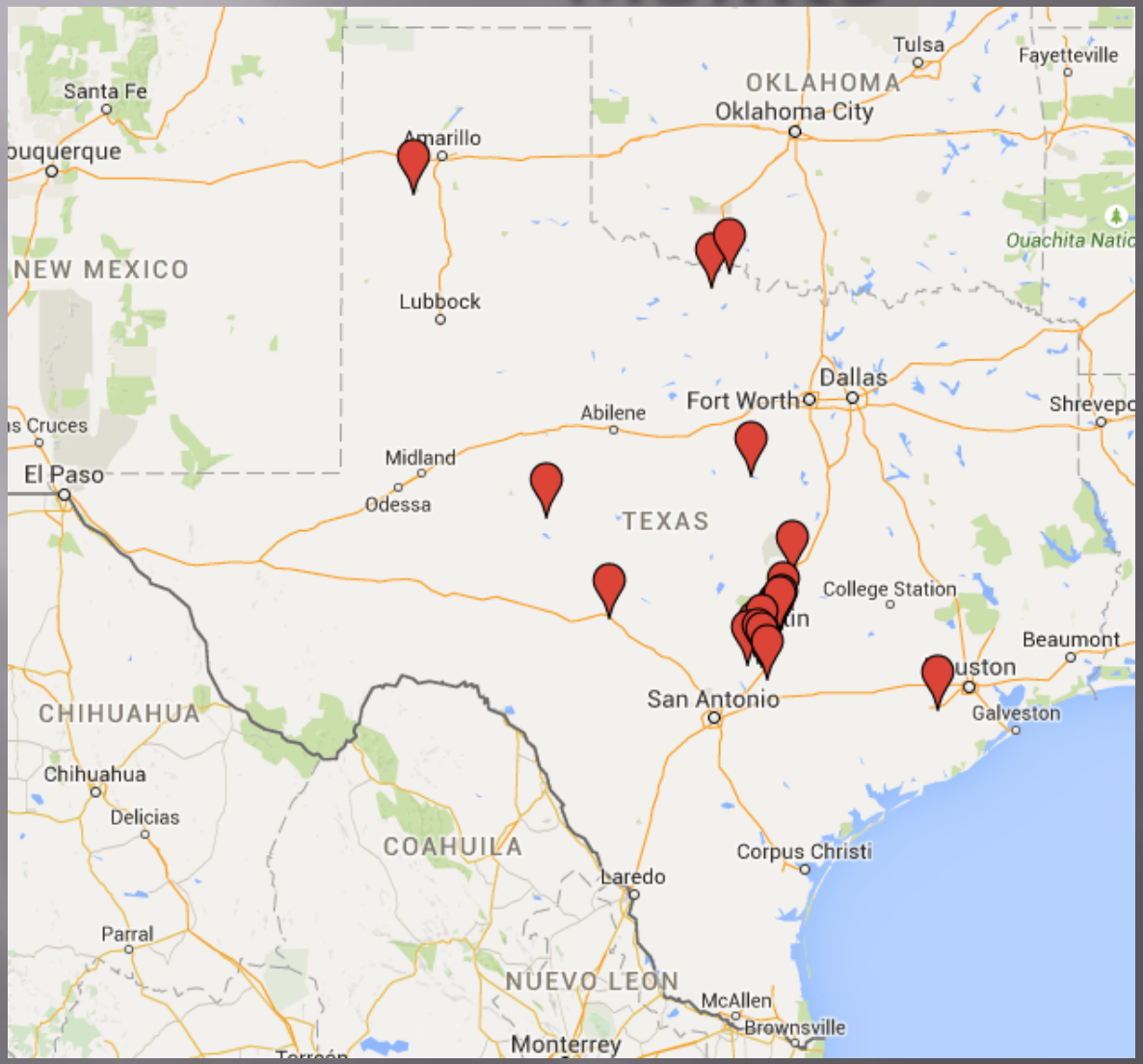


# Indirect Discharge Measurements

Indirect Discharge Measurements in Central Texas

(https://www.youtube.com/watch?v=IqXaQwfJVUg)

# 15 Sites Requiring Indirect Msmts



# Damage Caused by Flooding on Blanco River nr Wimberley, TX

# Some of the most Severe Flooding was along the Blanco River in Central Texas

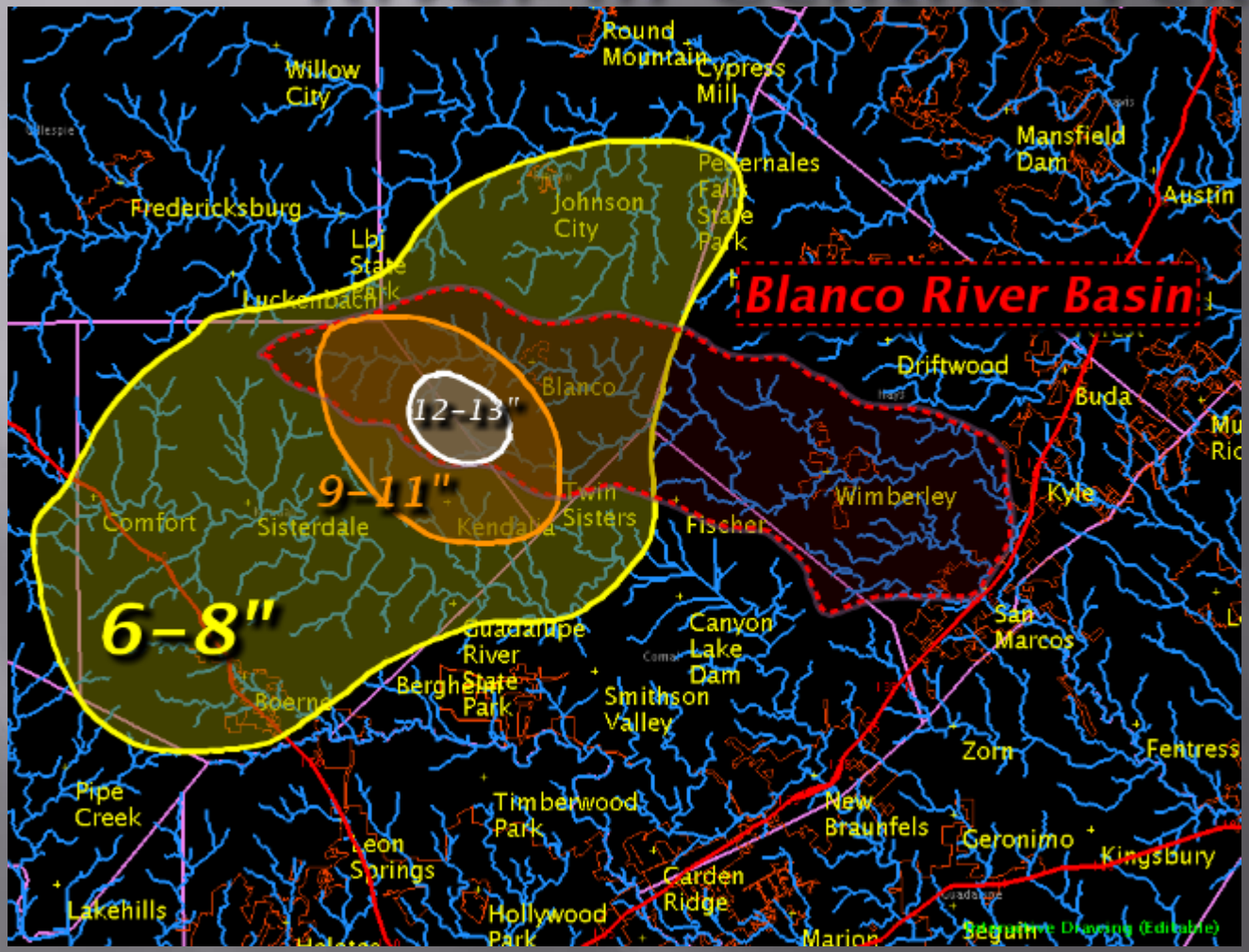
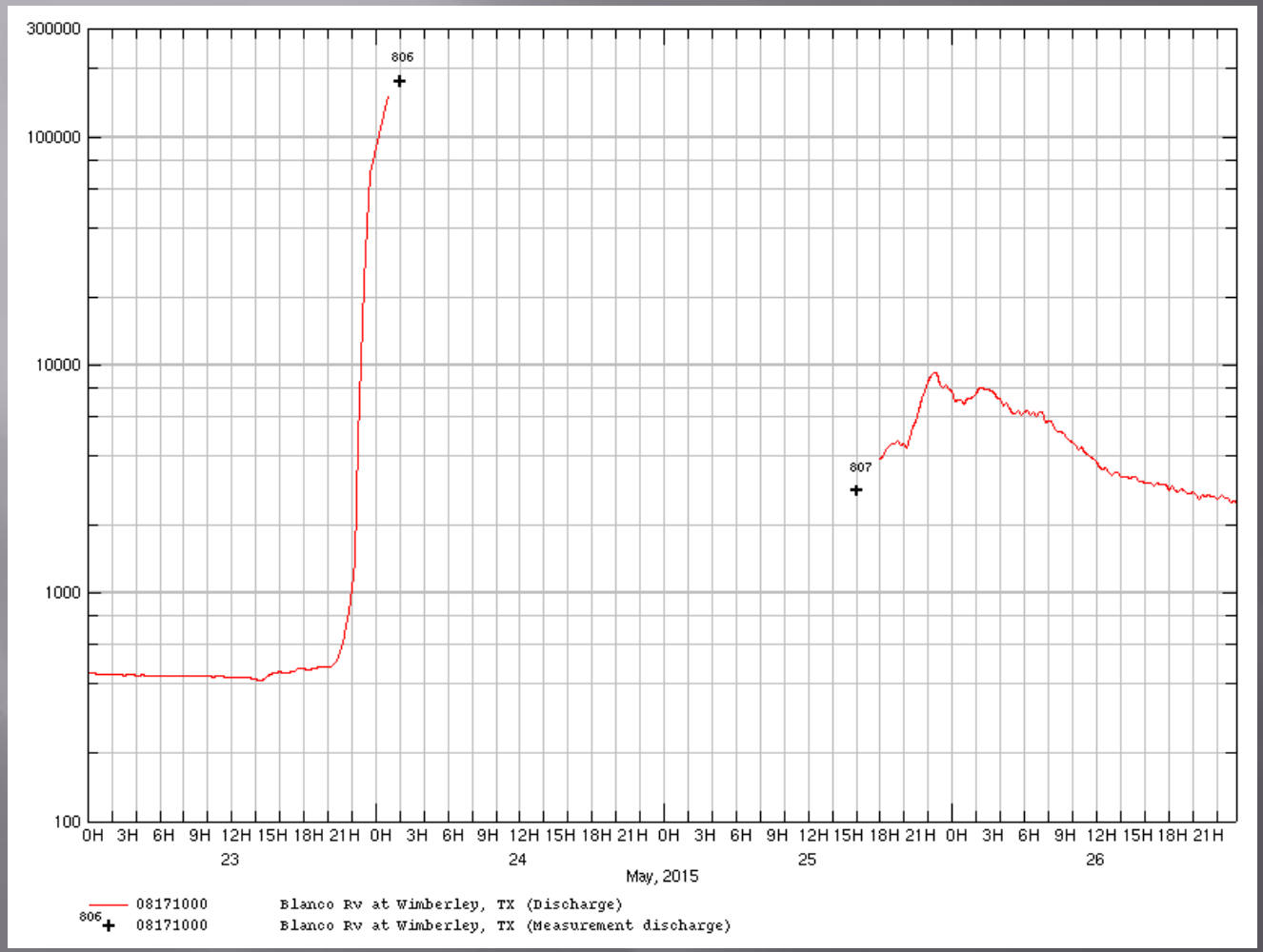



Figure from National Weather Service – Rainfall Amounts over 6 hour period May 23-24, 2015

# 08171000 – Blanco Rv at Wimberley, TX

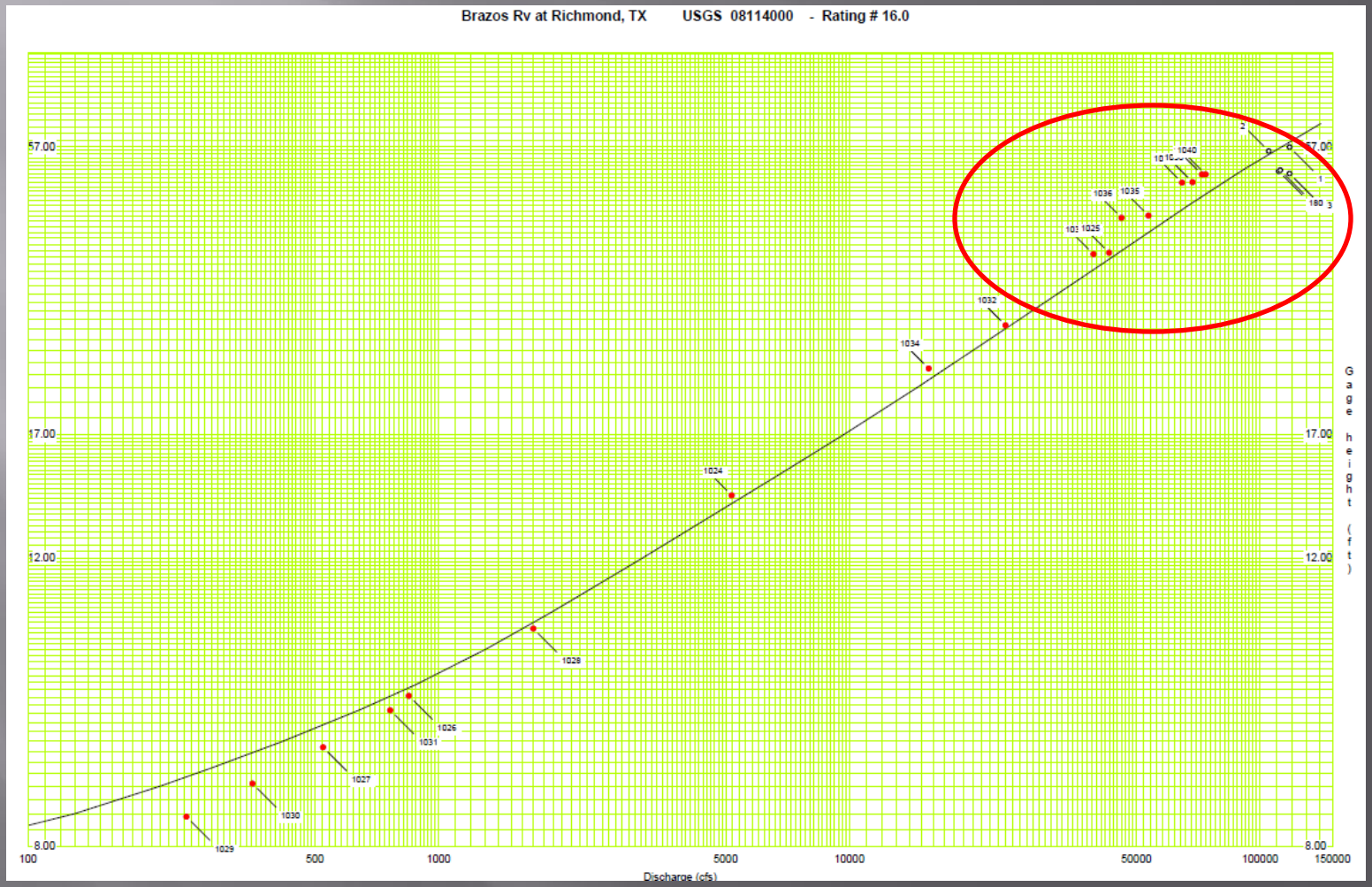



Stage increased over 40 ft in 4 hours

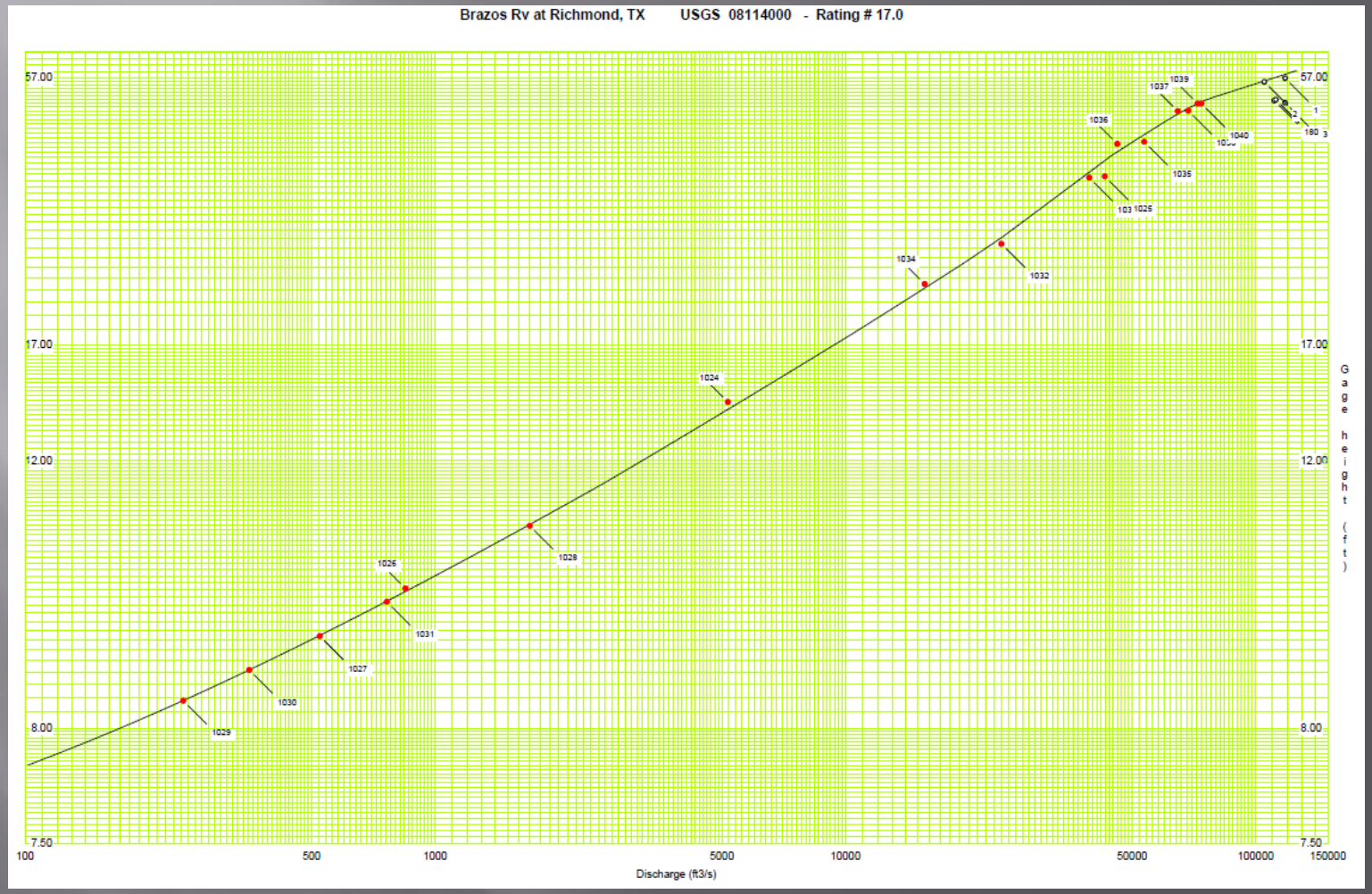
Discharge increased from 300 cfs to 175,000 cfs in approximately 4 hours

# USGS Gage 08171400 - San Marcos Rv at Martindale, TX

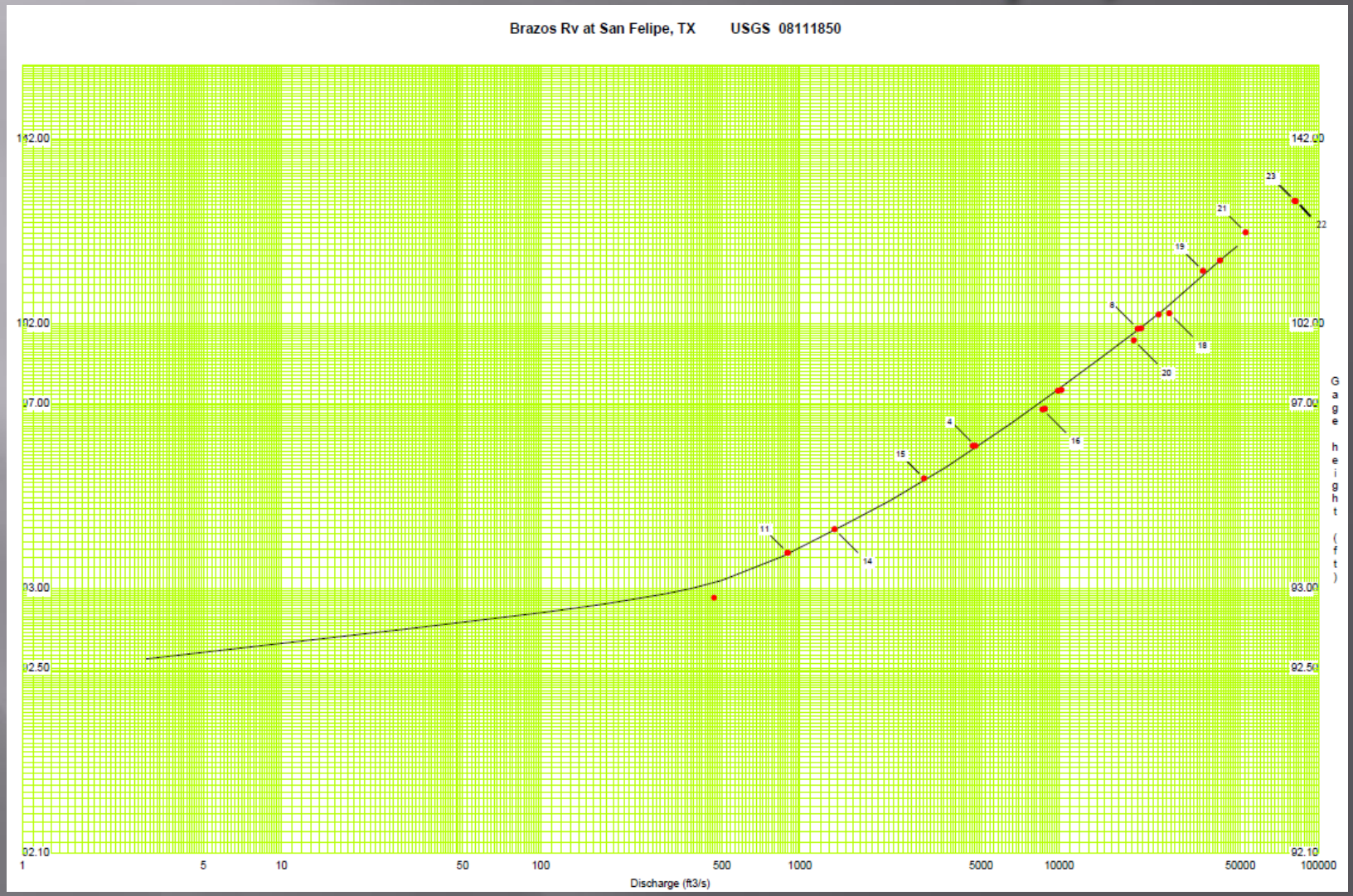
# Updating Existing Ratings
# Rating 16.0 – Prior to May 2015



# Updating Existing Ratings
# Rating 17.0 – After May 2015



# Extending Existing Ratings Brazos Rv at San Felipe, TX



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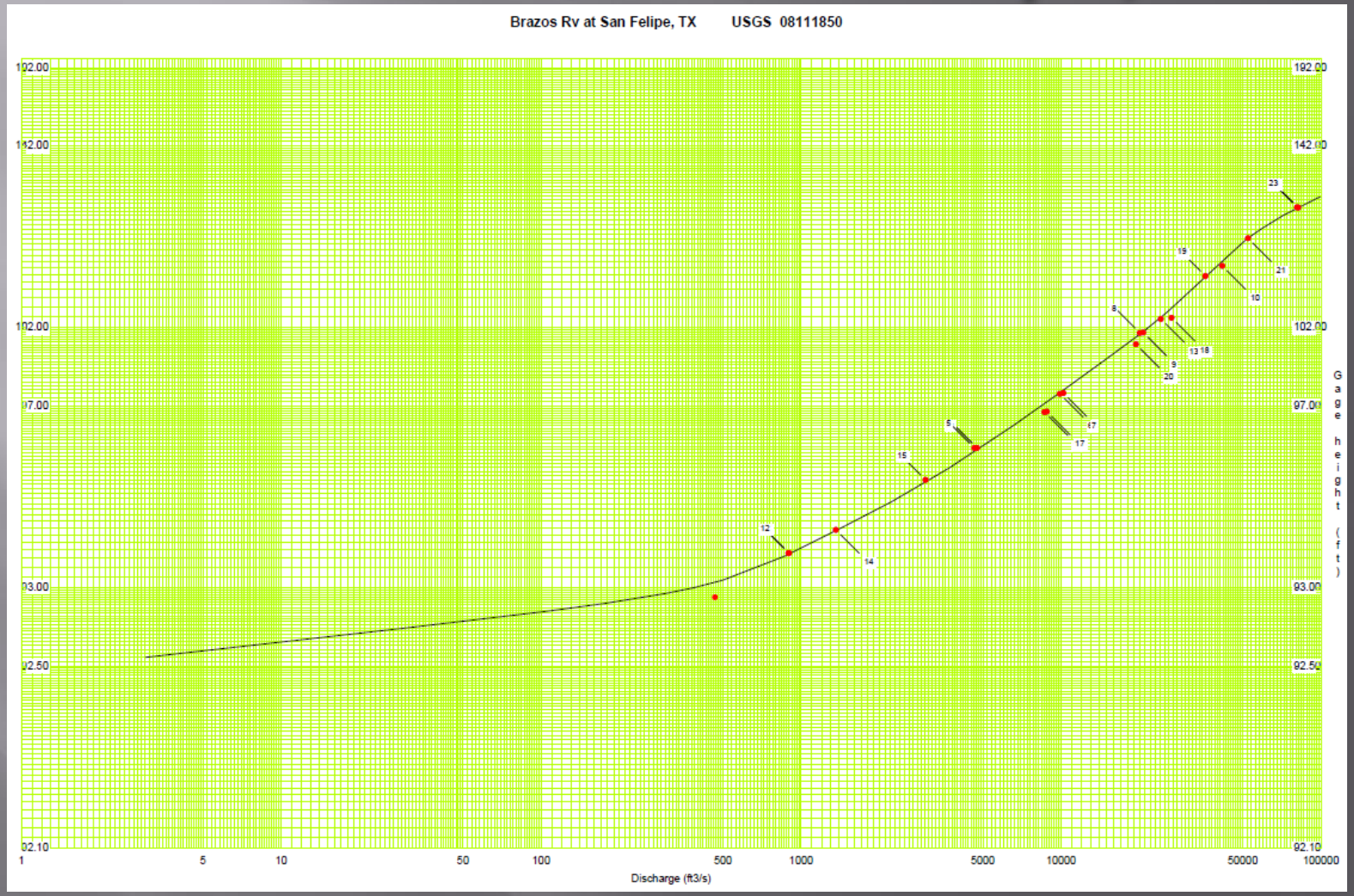
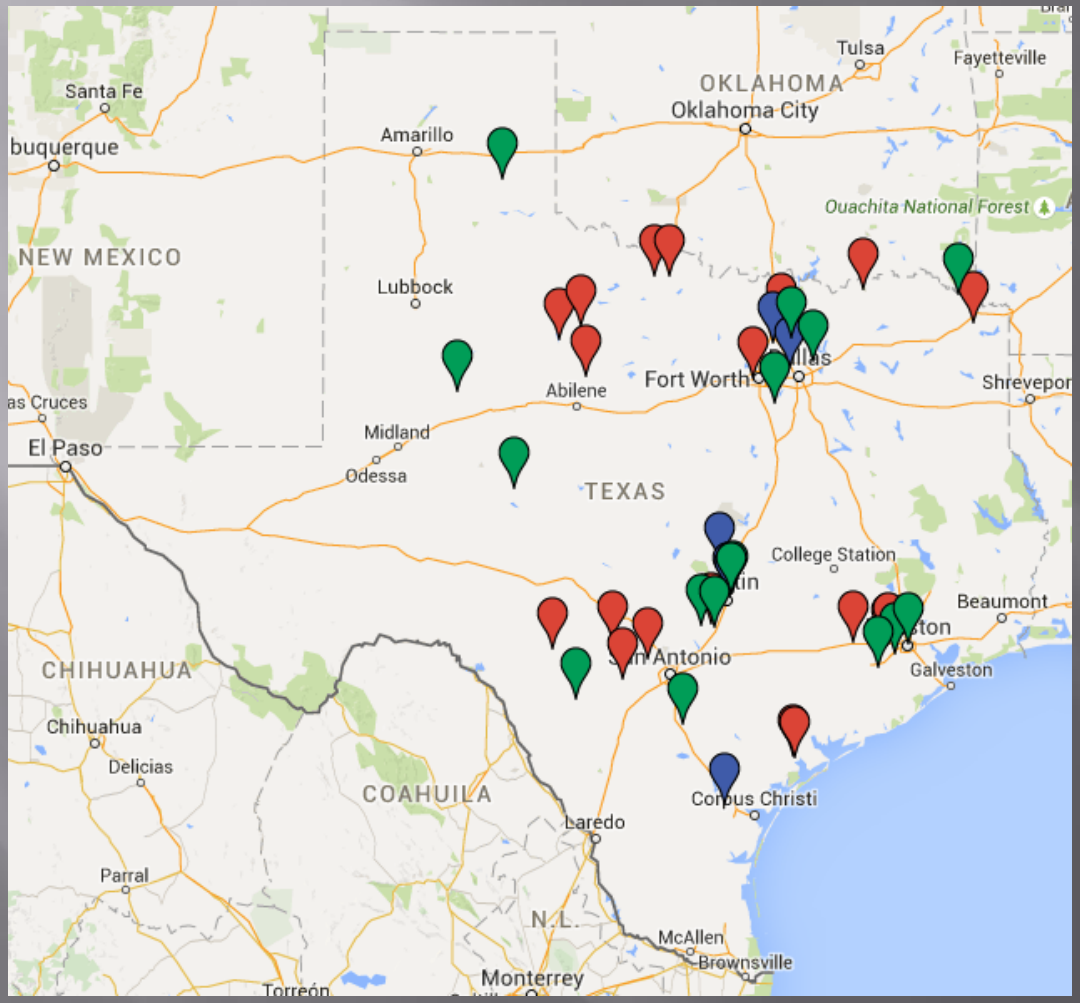


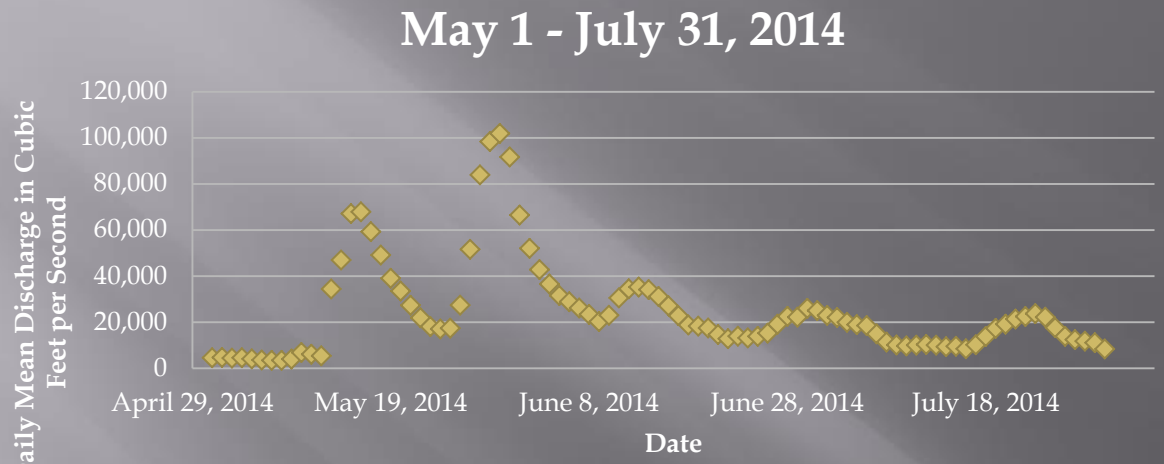
# Sites with New Peaks of Record



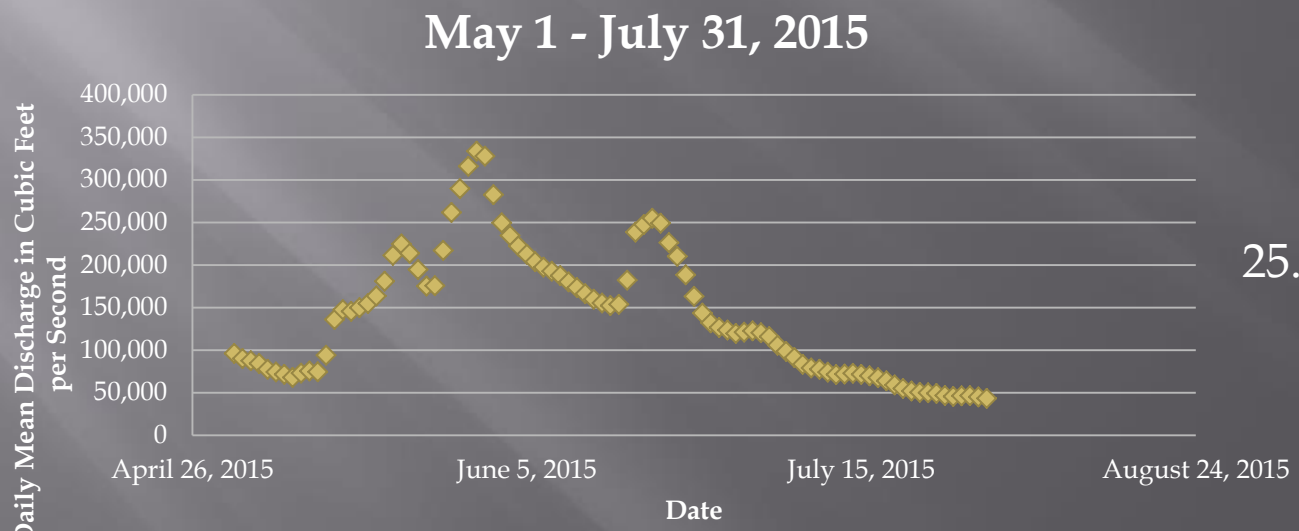

Period of Record

- 11 years or greater (16)
- 6 to 10 years (7)
- 5 years or less (19)

# Total Discharge to Gulf of Mexico from May–July 2015 Flood compared to May–July, 2014

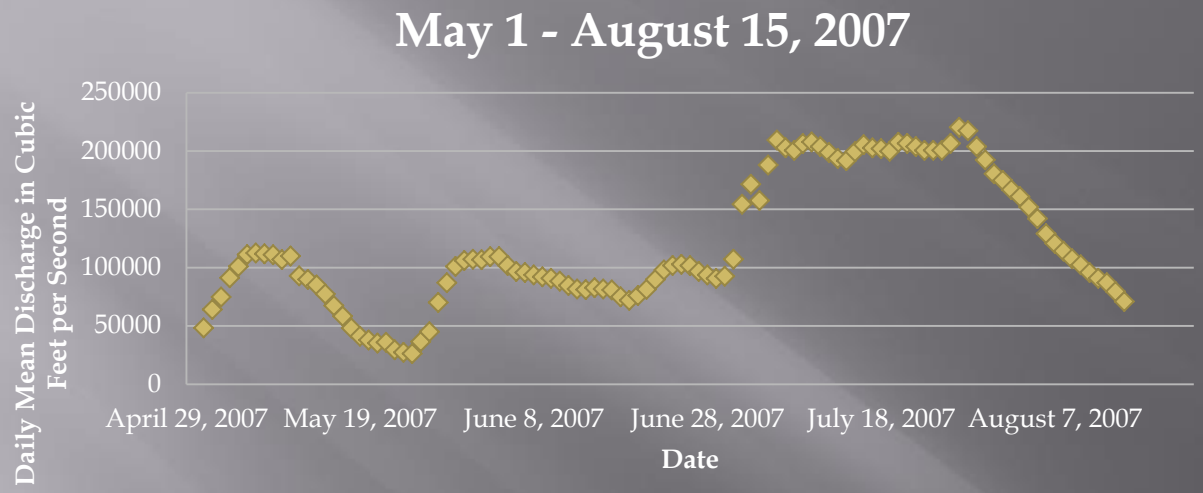



4.5 million acre-ft

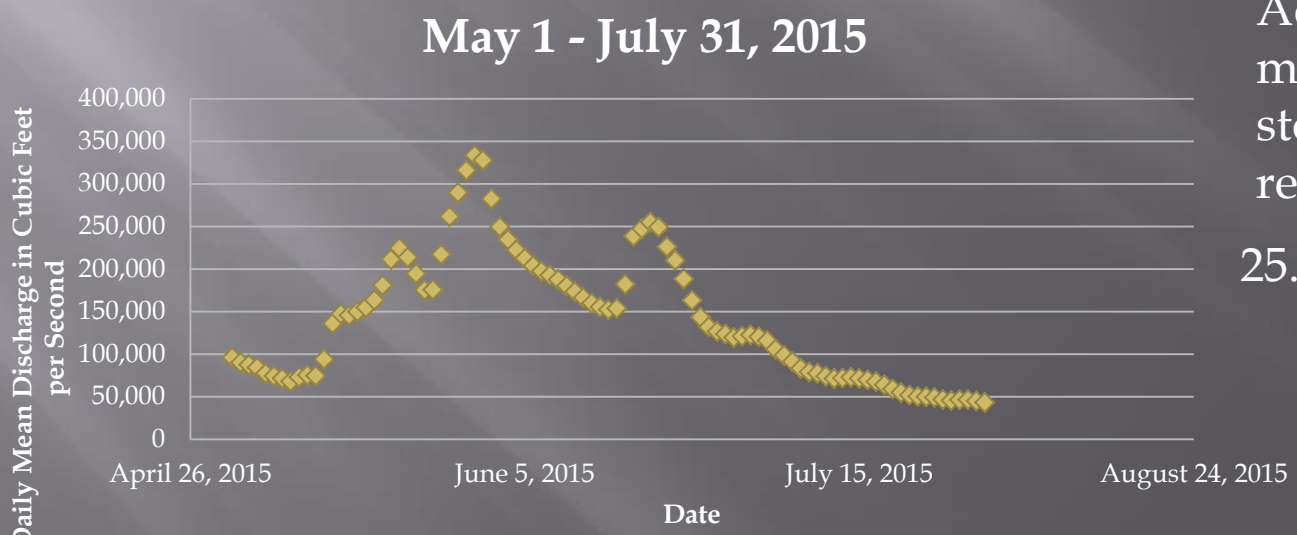



25.6 million acre-ft

# Total Discharge to Gulf of Mexico Compared to a Recent High-Flow Year




25.4 million acre-ft



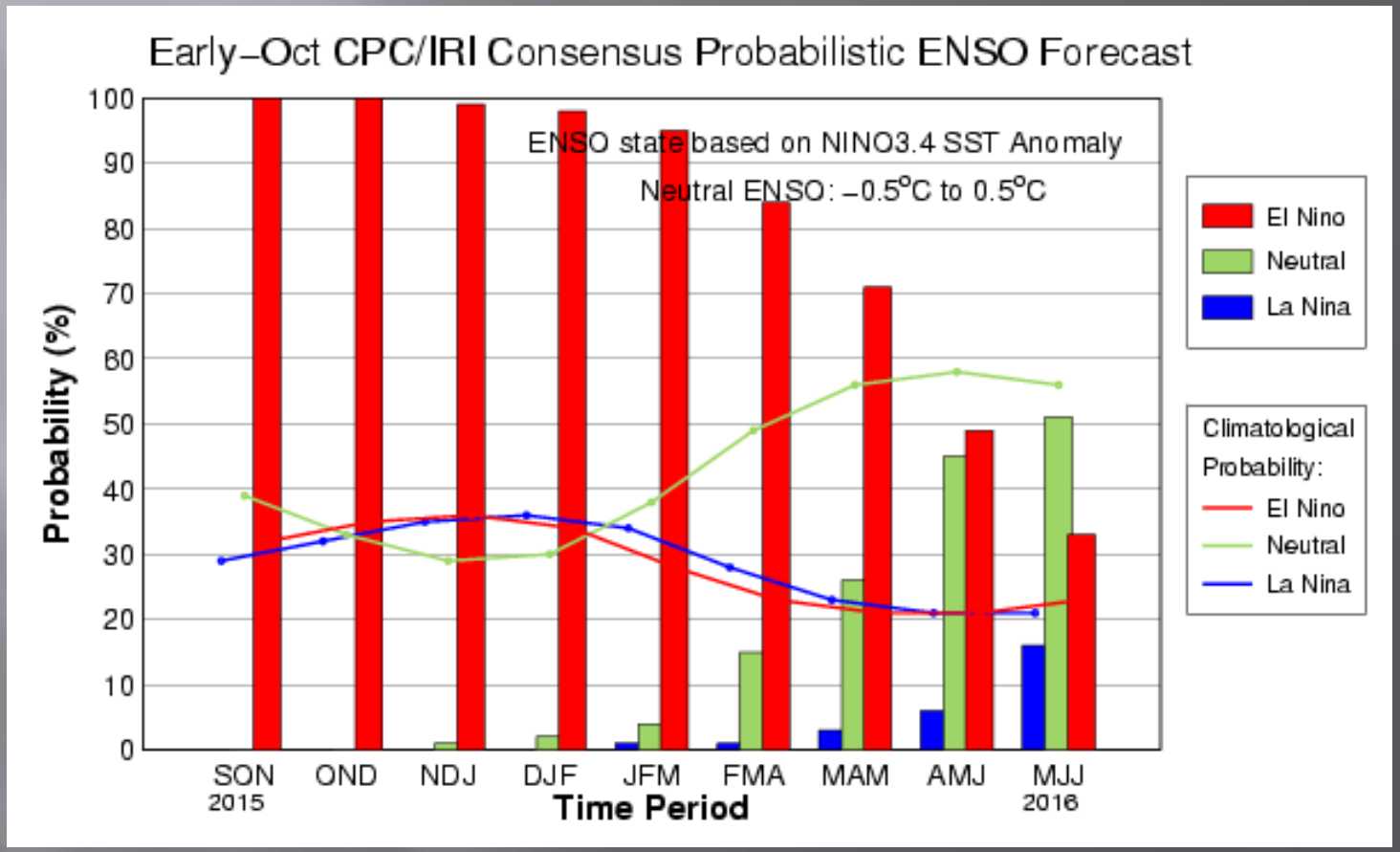

Additional 2.96 million acre-ft storage in reservoirs

25.6 million acre-ft

# The Future?

- According to NOAA, there is an approximately "95% chance that El Nino will continue through the Northern Hemisphere winter 2015-16, gradually weakening through spring 2016"

# Probabilistic ENSO Forecast (El Nino Southern Oscillation)



# Forecast of Sea Surface Temperature Anonalies

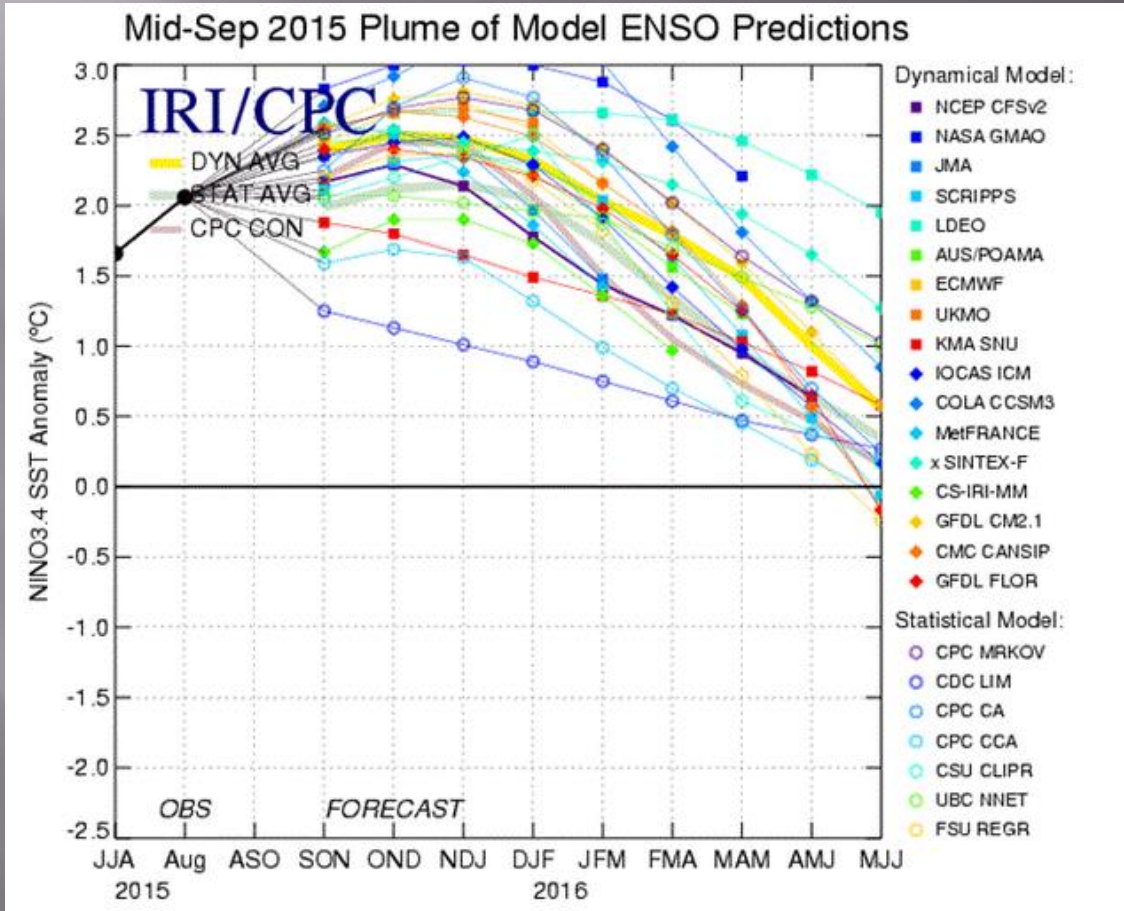
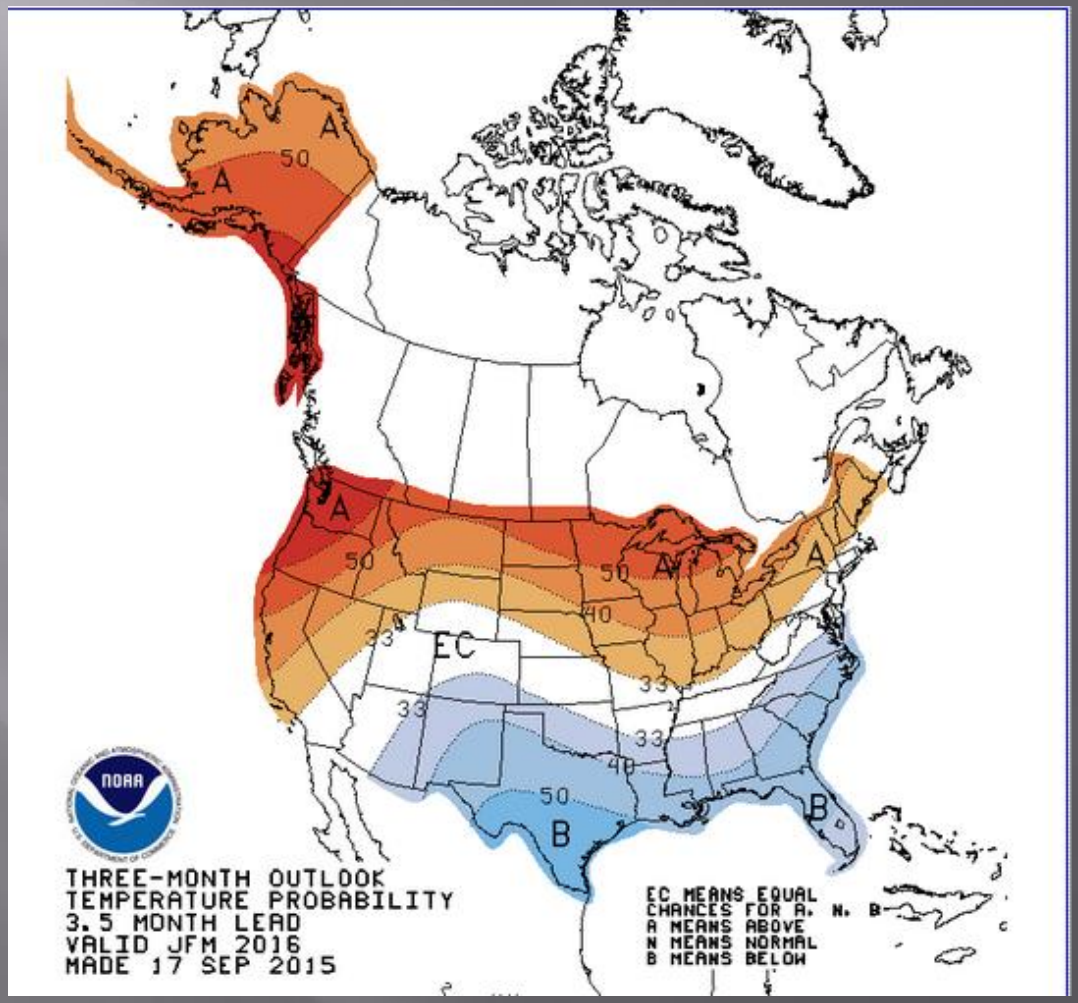
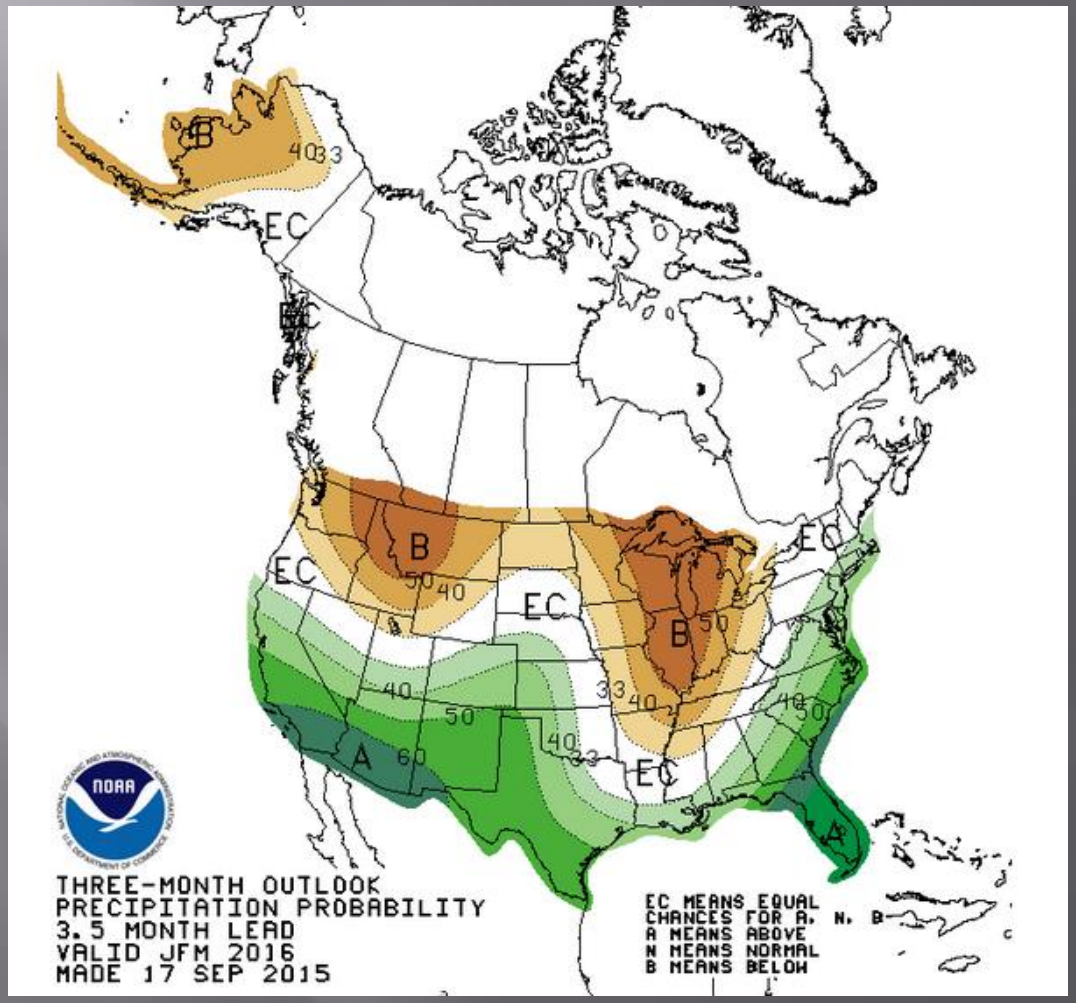



Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 15 September 2015.

# 3-Month Temperature Outlook



# 3 Month Precipitation Outlook



# Questions

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